Remarks

The Examiner will note that each of claims 23 and 30 has been amended to address the clarity issues raised in sections 2 and 3 of the Office Action. Applicants are grateful to the Examiner for identifying these issues. Applicants have also taken this opportunity to amend each of these claims to refer to first and second sets of channels and third and fourth sets of channels. It is submitted that these minor grammatical changes have no substantive impact on the scope of these claims.

Applicants do not offer any further amendment of the claims (23 to 30) as currently pending since, in applicants' view, these claims define an invention which is not rendered obvious under 35 U.S.C. §103(a) over the combination of Asahi (US6023359) in view of Prior Art Fig. 2.

The Examiner has indicated that Asahi differs from the present invention as defined by independent claims 23 and 30 in that Asahi fails to teach that the (serially connected) filters (comprising the first and third optical networks) are splitters. However, the Examiner contends that one skilled in the art would have been motivated to replace the filters of Asahi with the splitters of Prior Art Fig. 2 since Prior Art Fig. 2 suggests that using splitters offers the advantage of enabling the provision of low loss routes for wavelengths around the network etc.

Applicants submit that one skilled in the art would not seriously contemplate replacing the filters as taught by Asahi with the splitters of Prior Art Fig. 2 since to do so would go against the teaching of Asahi. Applicants also submit that, even if a skilled person did modify the network arrangement of Asahi to replace the filters with splitters, the resulting network arrangement would not comprise the features (limitations) of the network as defined by claim 23 of the present application.

Asahi discloses an optical fiber transmission ring linking a plurality of nodes 1-1 to 1-N by means of four optical transmission lines (fibers) 2-1 to 2-4. The four optical transmission lines comprise two working transmission lines 2-1 and 2-2 and two protection transmission lines 2-3 and 2-4 (column 7, lines 56 to 63). Each node 1-1 to 1-N includes wavelength multiplexing/de-multiplexing sections 101-104 for adding and dropping at that node signals transmissions at certain wavelengths λ1 to λN, each such wavelength comprising a transmission wavelength of a respective one of the nodes 1-1 to 1-N, i.e. each node transmits at a corresponding one of the wavelengths λ1 to λN (column 8, lines 13 to 19). For example, the four transmission units 107-110 of node 1-1 are set to transmit at wavelength λ1 whereas the transmission units of node 1-3 are set to transmit at wavelength λ3.

The multiplexing/de-multiplexing sections 101-104 of node 1-1 include respective couplers 101-3, 102-3, 103-3 and 104-3 for coupling the optical signals of the wavelength λ1 sent from the four transmission units 107-110 of this node to other signals on the transmission lines 2-1 to 2-4 under control of a wavelength control section 111 (column 8, lines 32 to 43).

The multiplexing/de-multiplexing sections 101-104 of node 1-1 also include respective optical variable wavelength filters 101-2, 102-2, 103-2 and 104-2 where optical signals being transmitted on the transmission lines 2-1 to 2-4 at say wavelength λ3 sent from node 1-3 can be selectively received at say node 1-1. Each of the variable wavelength filters 101-2, 102-2, 103-2 and 104-2 taps only the desired wavelength, λ3 in this example, in accordance with a control signal from the wavelength control section 111. In other words, the wavelength control section 111 of node 1-1 actively controls the variable filters to selectively tap a single wavelength transmitted from another of the nodes 1-2 to 1-N (column 9, lines 5 to 18 and column 10, lines 16 to 34).

Thus, it can be determined from the foregoing that, in the network arrangement of Asahi, it is essential that the filters at each node are actively controllable and wavelength variable for selecting the wavelength of the transmissions to be dropped from the transmission lines 2-1 to 2-4 at that node. Consequently, a skilled person would not seriously contemplate employing passive wavelength division devices such as the splitters taught in Prior Art Fig. 2 in the network of Asahi since to do so would compromise the ability of a node to selectively drop from the transmission lines signal transmissions at a specified wavelength emitted by another node.

Even if a skilled person did replace the variable wavelength filters of Asahi with the splitters of Prior Art Fig. 2, the resulting network arrangement would not be the same as that of the present invention. A wavelength splitter is a passive device that separates signals at a wavelength (or band of wavelengths) from signals at a different wavelength (or band of wavelengths), the separate different wavelengths being output on respective output ports of the passive splitter. A filter on the other hand is a device that can tap signals at a selected wavelength (or band of wavelengths) for output on a specified port of the device but does completely separate the signals at the selected wavelength from other signals at other wavelengths being transmitted through the device on say a transmission line. In other words, the signals at the selected wavelength are tapped from the transmission line rather than being diverted so that other nodes downstream on the transmission line can also tap signals at the same selected wavelength. It is for this purpose that amplifiers are included in the line as taught by Asahi to replace power to the signals at the selected wavelengths lost through the tapping of said signals. Consequently, if the variable filters of Asahi were replaced by the wavelength splitters of Prior Art Fig. 2, then the signals at a selected wavelength, say λ3, split from the transmission lines at say node 1-1 would not be available to node 1-2 to 1-N in the downstream direction contrary to the teaching of Asahi. Also, since each of the nodes of Asahi only transmits signals at a single wavelength, these signals would be able to pass around the transmission ring only as far as the position of the passive splitter tuned

to separate them from the transmissions lines. This further demonstrates that the use of variable filters is an essential element of the disclosure of Asahi and that a skilled person would not seriously contemplate modifying the network arrangement of this reference to replace the variable filters with splitters.

The present invention makes a useful contribution to the art in that it allows fiber ring networks typically employed in long haul or trunk routes to be employed in metro access networks, for example. It achieves this by replacing the prohibitively expensive active filter devices normally employed in such network architectures with relatively inexpensive splitter devices but does so by trading off network versatility, e.g. protection against fiber failures. For example, in contrast to Asahi, the present invention, which like Asahi utilizes four optical fibers (networks), does not provide two of such fibers as complementary protection fibers to two working transmission fibers. In the arrangement of the present invention, all four fibers are working transmission fibers. The compromise reached by the present invention in utilizing inexpensive passive splitter (and coupler) devices to enable the normal prohibitively expensive fiber ring network architectures to be employed in less economically attractive metro access networks is to provide no specified protection circuits for nodes of the network. The present invention accepts that, where a network failure occurs, nodes will have to make do with their specified allocation of wavelength specific inputs and outputs which may be severely compromised by such a failure leading to a reduction in service. In contrast, Asahi teaches a ring network architecture offering full and specified protection circuits employing expensive variable wavelength active filter devices in a manner similar to the prior art issues addressed by the present invention.

In view of the foregoing, it is submitted that the present invention as defined by claims 23 and 30 comprises an invention which is patentable over the combination of references Asahi and Prior Art Fig. 2. Favorable reconsideration of the claims is therefore requested.

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Respectfully submitted,

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